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Baerentzen, J.A.; Christensen, N.J.;
Shape Modeling International, 2002. Proceedings
17-22 May 2002 Page(s):175 - 182

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Huamin Qu; Nan Zhang; Ran Shao; Kaufman, A.; Mueller, K.;
Volume Visualization and Graphics, 2004 IEEE Symposium on
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Chandru, V.; Mahesh, N.; Manivannan, M.; Manohar, S.;
Computer Animation 2000. Proceedings
3-5 May 2000 Page(s):134 - 139

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Jing Hua; Hong Qin;
Computer Graphics and Applications, 2001. Proceedings. Ninth Pacific Conference on
16-18 Oct. 2001 Page(s):254 - 264

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1 Volume sculpting   ■
Sidney W. Wang, Arie E. Kaufman
April 1995 **Proceedings of the 1995 symposium on Interactive 3D graphics**

Full text available: 📄 pdf(3.92 MB)   Additional Information: full citation, abstract, references, citings, index terms

We present a modeling technique based on the metaphor of interactively sculpting complex 3D objects from a solid material, such as a block of wood or marble. The 3D model is represented in a 3D raster of voxels where each voxel stores local material property information such as color and texture. Sculpting is done by moving 3D voxel-based tools within the model. The affected regions are indicated directly on the 2D projected image of the 3D model. By reducing the complex operations between ...

2 Interaction: Real-time haptic sculpting in virtual volume space   ■
Hui Chen, Hanqiu Sun
November 2002 **Proceedings of the ACM symposium on Virtual reality software and technology**

Full text available: 📄 pdf(523.69 KB)   Additional Information: full citation, abstract, references, citings, index terms

Virtual sculpture is a modeling technique for computer graphics based on the notion of sculpting a solid material with tools. Currently, most interactive sculpture is mainly focused on vision-based sensory channel. With visual feedback alone virtual sculpture cannot simulate the realistic sculpting operations in the physical world. The sense of touch, in combination with our kinesthetic sense, is capable of adding a new modality to virtual sculpture, especially in presenting complex geometry & m ...

Keywords: haptic interaction, virtual reality, virtual sculpture, volume rendering

3 Feature-based volume metamorphosis   ■
Apostolos Lerios, Chase D. Garfinkle, Marc Levoy
September 1995 **Proceedings of the 22nd annual conference on Computer graphics and interactive techniques**

Full text available: 📄 pdf(313.03 KB)   Additional Information: full citation, references, citings, index terms

Keywords: blending, computer animation, rendering, sculpting, shape interpolation,

transformation, volume morphing, warping

4 Kizamu: a system for sculpting digital characters

Ronald N. Perry, Sarah F. Frisken

August 2001 **Proceedings of the 28th annual conference on Computer graphics and interactive techniques**

Full text available: pdf(4.04 MB)   Additional Information: full citation, abstract, references, citings, index terms

This paper presents Kizamu, a computer-based sculpting system for creating digital characters for the entertainment industry. Kizamu incorporates a blend of new algorithms, significant technical advances, and novel user interaction paradigms into a system that is both powerful and unique.

To meet the demands of high-end digital character design, Kizamu addresses three requirements posed to us by a major production studio. First, animators and artists want *digital clay* — a ...

Keywords: ADFs, character design, digital sculpting, distance fields, graphics systems, rendering, triangulation, volume modeling

5 Three dimensional freeform sculpting via zero sets of scalar trivariate functions

Alon Raviv, Gershon Elber

June 1999 **Proceedings of the fifth ACM symposium on Solid modeling and applications**

Full text available: pdf(2.19 MB)   Additional Information: full citation, references, citings, index terms

6 Modeling and manipulation: Real-time volume manipulation

V. Singh, D. Silver, N. Cornea

July 2003 **Proceedings of the 2003 Eurographics/IEEE TVCG Workshop on Volume graphics**

Full text available: pdf(479.03 KB)   Additional Information: full citation, abstract, references

In this paper, we describe a set of algorithms and an implementation (called VolEdit), for interactively manipulating 3D volumetric objects (datasets). The system utilizes skeletons, which allows users/animators to interactively and intuitively specify the location and type of deformation desired. The skeleton is extracted automatically from the volumetric model and indexes the appropriate part of the volume that needs to be transformed by defining piecewise bounds of the volume. The deformed vo ...

Keywords: animation, bounding boxes, deformation, manipulation, mid-plane geometry, skeleton, texture mapping

7 Poster Session: Interactive sculpturing and visualization of unbounded voxel volumes

Ralf Böonning, Heinrich Müuller

June 2002 **Proceedings of the seventh ACM symposium on Solid modeling and applications**

Full text available: pdf(257.13 KB)   Additional Information: full citation, abstract, references, citings, index terms

A difficulty of voxel-based sculpturing and modeling is the limitation of the design space by the fixed boundaries of the voxel volume.We present the concept of an infinite voxelized virtual modeling space. A finite shape located in the virtual modeling space is embedded in

a voxel window which is enlarged if required by the spatial development of the shape. In order to cope with highly resolved or large shapes, the voxel windows are stored in a virtual voxel memory which implements a paging mec ...

Keywords: adaptive surface extraction, computer-aided sculpturing, external memory data structures, volume modeling

8 Haptics: Haptics-based volumetric modeling using dynamic spline-based implicit functions
Jing Hua, Hong Qin
October 2002 **Proceedings of the 2002 IEEE symposium on Volume visualization and graphics**

Full text available: pdf(5.78 MB)   Additional Information: full citation, abstract, references, citings, index terms

This paper systematically presents a novel haptics-based volumetric modeling framework, which is founded upon volumetric implicit functions and powerful physics-based modeling. The volumetric implicit functions incorporate hierarchical B-splines, CSG-based functional composition, and knot insertion to facilitate multiresolution editing and level of details (LODs) control. Our dynamic volumes are semi-algebraic sets of implicit functions and are governed by the principle of dynamics, hence respon ...

9 Level set surface editing operators
Ken Museth, David E. Breen, Ross T. Whitaker, Alan H. Barr
July 2002 **ACM Transactions on Graphics (TOG) , Proceedings of the 29th annual conference on Computer graphics and interactive techniques**, Volume 21 Issue 3

Full text available: pdf(11.19 MB)   Additional Information: full citation, abstract, references, citings, index terms

We present a level set framework for implementing editing operators for surfaces. Level set models are deformable implicit surfaces where the deformation of the surface is controlled by a speed function in the level set partial differential equation. In this paper we define a collection of speed functions that produce a set of surface editing operators. The speed functions describe the velocity at each point on the evolving surface in the direction of the surface normal. All of the information n ...

Keywords: deformations, geometric modeling, implicit surfaces, shape blending

10 A procedural approach to authoring solid models
Barbara Cutler, Julie Dorsey, Leonard McMillan, Matthias Müller, Robert Jagnow
July 2002 **ACM Transactions on Graphics (TOG) , Proceedings of the 29th annual conference on Computer graphics and interactive techniques**, Volume 21 Issue 3

Full text available: pdf(11.99 MB)   Additional Information: full citation, abstract, references, citings, index terms

We present a procedural approach to authoring layered, solid models. Using a simple scripting language, we define the internal structure of a volume from one or more input meshes. Sculpting and simulation operators are applied within the context of the language to shape and modify the model. Our framework treats simulation as a modeling operator rather than simply as a tool for animation, thereby suggesting a new paradigm for modeling as well as a new level of abstraction for interacting with si ...
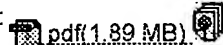
Keywords: signed-distance function, tetrahedral representation, volumetric modeling

11 A haptic interaction method for volume visualization
Ricardo S. Avila, Lisa M. Sobierajski
October 1996 **Proceedings of the 7th conference on Visualization '96**

Full text available: pdf(1.89 MB) Additional Information: full citation, references, citings, index terms
Publisher Site

12 Interactive modeling: Interactive modeling of topologically complex geometric detail
Jianbo Peng, Daniel Kristjansson, Denis Zorin
August 2004 **ACM Transactions on Graphics (TOG)**, Volume 23 Issue 3

Full text available: pdf(1.73 MB) Additional Information: full citation, abstract, references, index terms

Volume textures aligned with a surface can be used to add topologically complex geometric detail to objects in an efficient way, while retaining an underlying simple surface structure.Adding a volume texture to a surface requires more than a conventional two-dimensional parameterization: a part of the space surrounding the surface has to be parameterized. Another problem with using volume textures for adding geometric detail is the difficulty in rendering implicitly represented surfaces, especia ...

Keywords: modeling, volumetric rendering, volumetric texture

13 3D texture: Volumetric illustration: designing 3D models with internal textures
Shigeru Owada, Frank Nielsen, Makoto Okabe, Takeo Igarashi
August 2004 **ACM Transactions on Graphics (TOG)**, Volume 23 Issue 3

Full text available: pdf(461.67 KB) Additional Information: full citation, abstract, references
mov(19:19 MIN)
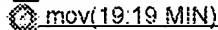
This paper presents an interactive system for designing and browsing volumetric illustrations. Volumetric illustrations are 3D models with internal textures that the user can browse by cutting the models at desired locations. To assign internal textures to a surface mesh, the designer cuts the mesh and provides simple guiding information to specify the correspondence between the cross-section and a reference 2D image. The guiding information is stored with the geometry and used during the synthe ...
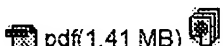
Keywords: Interactive Techniques, Non-Photorealistic Rendering, Texture Synthesis, Volumetric Modeling

14 Interactive visualization of mixed scalar and vector fields
Lichan Hong, Xiaoyang Mao, A. Kaufman
October 1995 **Proceedings of the 6th conference on Visualization '95**

Full text available: pdf(1.41 MB) Additional Information: full citation, abstract, citings
Publisher Site

This paper describes an approach for interactive visualization of mixed scalar and vector fields, in which vector icons are generated from pre-voxelized icon templates and volume-rendered together with the volumetric scalar data. This approach displays simultaneously the global structure of the scalar field and the detailed features of the vector field. Interactive visualization is achieved with incremental image update, by re-rendering only a small portion of the image wherever and whenever a c ...

15 3D chainmail: a fast algorithm for deforming volumetric objects
Sarah F. Gibson

April 1997 **Proceedings of the 1997 symposium on Interactive 3D graphics**

Full text available: 📄 pdf(748.84 KB)   Additional Information: full citation, references, citings, index terms

16 Augmented reality / 3D modeling: An immersive modeling system for 3D free-form design using implicit surfaces

Masatoshi Matsumiya, Haruo Takemura, Naokazu Yokoya

October 2000 **Proceedings of the ACM symposium on Virtual reality software and technology**

Full text available: 📄 pdf(2.09 MB)   Additional Information: full citation, abstract, references

We present a new free-form interactive modeling technique based on the metaphor of clay work. This paper discusses design issues and an immersive modeling system which enables a user to design intuitively and interactively 3D solid objects with curved surfaces by using one's finger. Shape deformation is expressed by simple formulas without complex calculation because of skeletal implicit surfaces employed to represent smooth free-form surfaces. A polygonization algorithm that generates polygonal ...

Keywords: CAD, Head Mounted Displays, Implicit Surfaces, Solid Modeling, Virtual Reality

17 Functionally based virtual computer art

Alexei Sourin

March 2001 **Proceedings of the 2001 symposium on Interactive 3D graphics**

Full text available: 📄 pdf(1.34 MB)   Additional Information: full citation, references, citings, index terms

Keywords: carving, computer art, embossing, functionally based shape modeling, virtual reality

18 An alternative way of drawing

Roope Raisamo

May 1999 **Proceedings of the SIGCHI conference on Human factors in computing systems: the CHI is the limit**

Full text available: 📄 pdf(1.02 MB)   Additional Information: full citation, abstract, references, citings, index terms

Current object-oriented drawing programs have an established way of drawing in which the shape of an object is controlled by manipulating control points. While the control points are intuitive in their basic use, it is not clear whether they make more complex drawing tasks manageable for the average user. In this paper we describe an alternative way of drawing and editing a drawing using new direct manipulation tools. Our approach resembles sculpting in two dimensions: the user begins ...

Keywords: direct manipulation, drawing programs, interaction techniques, sculpting, two-handed interaction

19 Modeling and manipulation: Volumetric ablation rendering

Hari Varadhan, Klaus Mueller

July 2003 **Proceedings of the 2003 Eurographics/IEEE TVCG Workshop on Volume graphics**

Full text available: 📄 pdf(1.26 MB)   Additional Information: full citation, abstract, references

In this paper, we propose a physically-based method for simulating the process of ablation on volumetric models. We demonstrate the visual effect of ablative processes, such as a beam of heat emitted from a blow torch or a pencil of sand expelled from a sandblaster. Users are able to control ablative properties, such as energy propagation, absorption, and material evaporation, via a simple transfer function interface, while the effect of different beam shapes can be modeled by ways of weighting ...

20 Surface drawing: creating organic 3D shapes with the hand and tangible tools
Steven Schkolne, Michael Pruett, Peter Schröder
March 2001 **Proceedings of the SIGCHI conference on Human factors in computing systems**

Full text available: pdf(12.98 MB)   Additional Information: full citation, abstract, references, citings, index terms

Surface Drawing is a system for creating organic 3D shapes in a manner which supports the needs and interests of artists. This medium facilitates the early stages of creative design which many 3D modeling programs neglect. Much like traditional media such as line drawing and painting, Surface Drawing lets users construct shapes through repeated marking. In our case, the hand is used to mark 3D space in a semi-immersive virtual environment. The interface is completed with tangible tools to e ...

Keywords: 3D modeling, artistic shape creation, design prototyping, fine art, hand-based interface, repeated marking, semi-immersive environment, tangible user interface

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